DOCUMENT RESUME

ED 037 810 EA 002 726

TITLE	Data Processing and a State Educational Information System. A Pilot Project.
INSTITUTION	Educational Research Services, Inc., White Plains, N.Y.
SPONS AGENCY	New York State Education Dept., Albany.
PUB DATE	Nov 64
NOTE	55p.
EDRS PRICE	EDRS Price MF-$0.25 HC-$2.85
DESCRIPTORS	Data Collection, Degrees (Titles), *Electronic Data Processing, *Higher Education, *Information Networks, Personnel Data, Pilot Projects, Professional Personnel, *State Departments of Education, Student Enrollment, Substitute Teachers, Teacher Certification, *Urban Schools

ABSTRACT

This is a report of a pilot project directed toward planning an educational information network. The network will eventually connect the information processing capabilities of the New York City school system to information processing of the State Education Department in Albany. The study reported the fall enrollment and degrees conferred in higher educational institutions throughout New York State and studied how teacher personnel information was collected, processed, and then transmitted from the New York City school system to the State Education Department. The document contains samples of the various types of forms used in the reporting and also discusses the usefulness and the problems of each item of information. A chapter is devoted to the implications of the pilot project for building a State education information network that may also be coordinated with the U.S. Office of Education. A digest of the results of a sampling of higher educational institution data processing programs currently in use is provided in an appendix. (DE)

ED037810

DATA PROCESSING
AND A
STATE EDUCATIONAL INFORMATION SYSTEM

Prepared for

The University of the State of New York

The State Education Department

A PILOT PROJECT

EA 002 726

Educational
Research SCHOOL AND COLLEGE CONSULTANTS
Services inc.

ED037810

DATA PROCESSING AND A STATE EDUCATIONAL INFORMATION SYSTEM

A PILOT PROJECT

Prepared for
The University of the State of New York
The State Education Department

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

November 1964

Educational Research Services, Inc.,
7 Holland Avenue, White Plains, N.Y.

FOREWORD

This report was prepared under contract for the New York State Education Department as a pilot project examining uses of computers in State statistical reporting in education. It is limited to higher education reporting of fall enrollments and degrees conferred and reporting of teacher personnel in New York City.

The higher education phase of the study was derived from correspondence and field visits to six institutions: Broome Technical Community College, Cornell University, Harpur College, New York University, Rensselaer Polytechnic Institute and University of Rochester. Considerable credit is due David A. Warren, Associate Registrar, Cornell University, for this phase of the study.

Numerous individuals contributed to the preparation of this report. In great part it is to be considered a cooperative project. Participants include: Lorne H. Woollatt, Associate Commissioner for Research, Irwin K. French, Director, and Robert H. McCambridge, Associate Director, Office of Adminstrative Services in Higher Education, John J. Stiglmeier, Chief, Bureau of Statistical Services, and Ruth Callaghan, Director, Division of Electronic Data Processing, all of the New York State Education Department; Thomas H. Shea, Director of Institutional Research and Arnold Spaner, Principal Administrative Analyst, State University of New York; Harvey N. Roehl, Associate Dean and Registrar, Broome Technical Community College, Ralph B. von Guerard, Registrar and Frank Dana, Associate Registrar, New York University, John A. Dunlop, Registrar, Rensselaer Polytechnic Institute, Robert E. Cyphers, Director of Registration, University of Rochester; Frederick W. Hill, Deputy Superintendent, Raymond McDaniel, Director of Management Information and Data Processing, and Joseph Justman, Acting Director, Bureau of Education Research and Statistics of the Board of Education, New York City.

Francis G. Cornell

TABLE OF CONTENTS

I	REQUIREMENTS OF STATE EDUCATIONAL STATISTICS REPORTING SYSTEMS	1
	The GE 225 Computer	1
	Considerations in Designing Reporting Systems	3
II	REPORTING FALL ENROLLMENT IN HIGHER EDUCATIONAL INSTITUTIONS	5
	Nature of the Report	6
	The State Education Department Requirements	7
	Requirements of Individual Institutions	11
	The Communication Link Between Institution and State	17
	Reporting College Degrees Conferred	24
III	NEW YORK CITY AND PROFESSIONAL PERSONNEL	27
	The Professional Personnel Information	28
	The Unique Aspects of New York City	28
	Possible Steps to Take	30
IV	IMPLICATIONS FOR BUILDING A STATE EDUCATION INFORMATION NETWORK	32
	APPENDIX -- DIGEST OF SAMPLE OF RELATED HIGHER EDUCATIONAL INSTITUTION DATA PROCESSING PROGRAMS	35
	Broome Technical Community College	35
	Cornell University	38
	Harpur College	41
	New York University	43
	Rensselaer Polytechnic Institute	47
	University of Rochester	49

REQUIREMENTS OF STATE EDUCATIONAL STATISTICS REPORTING SYSTEMS

This is a report of a pilot project limited to ways of reporting fall enrollment and degrees conferred in higher educational institutions and ways of transmitting teacher personnel information from the New York City School System to the State Education Department.

In the initial conference held on the project, discussions of how work with a computer in a college could be related to a computer in Albany led to interest in the system. This implies attention to the why and to many contributing purposes and activities, including a recognition of the importance of institutional and local interests as part of the State system.

The GE 225 Computer

The occasion for the study was, in part, the installation in the State Education Department of the GE 225 Computer. The addition of this hardware to the processing facilities of the Department justifies a new look at statistical reporting because capabilities for handling masses of data on the State level have markedly increased. What with improvements also in equipment for processing in reporting agencies, school systems and colleges, the time is at hand for anticipating ways in which full advantage is to be taken of this development in technology.

From the standpoint of reporting of the type under examination in this analysis, the gains at the State level can be described briefly as these:

a) Speed. The GE 225 is a transistorized digital computer which, with peripheral equipment, can

Read cards - 400 or 1,000 per minute
Punch cards - 100 per minute
Read paper tape - 250 or 1,000 characters per second
Punch paper tape - 110 characters per second
Read from and write on magnetic tape - 15,000 or 41,600 characters per second
Print - 150 or 900 lines per minute

b) Capacity. The GE 225 processes both alphanumeric and binary information. Both data to be processed and a program (instructions) are stored in a memory component using basically a "word" consisting of 20 bits plus a parity bit. Such computers can accept large masses of data and perform complex arithmetical operations in addition to sorting, collating, counting (summing, adding, totalling) necessary with most statistical reports in education. It is of interest that their first application in educational agencies is usually payroll work which requires multiplication, division, as well as addition and subtraction because of payroll rates, withholding computations, etc. The capacity for mathematical work of such a computer is remarkably suited to applications of controlling production, controlling inventories and scientific research. The mathematical power of computers has been used in types of work with educational statistics concerned with rotating matrices in factor analysis, multiple regression analysis, extraction of roots of equations, linear programming and the like.

c) Accessibility. Rapid advances in the computer field has greatly broadened the scope of applications. Computers of the GE 225 type add flexibility not only because of the breadth of operations which may be performed, but also because of the variations in input and output operations. Information can be accepted not only from punched cards, magnetic tape, punched paper tape, but also by optical scanning devices and equipment for recognizing characters in magnetic ink. The GE 225 system includes equipment which can accommodate 15 lines for communication with remote input/output stations via two-wire cables, toll telephone or telegraph quality channels.

Largely because of the speed and accessibility features, it has been considered worth examing the communication system between the State and its respondents and implications for developing a State reporting network. Conferences on the subject touched upon considerations other than hardware related to designing such a network. Some of these which bear on observations in this report are outlined below.

Considerations in Designing Reporting Systems

In a very real sense the adequacy of a reporting system should not be determined initially by descriptions of what available equipment can do. Instrumentation should be adapted to the task. It seems logical that, in building a reporting network, some of the following points should be taken into account:

1. Function. Covering the substance which should be covered.

   a) Free of unnecessary duplication and too frequent reporting.

   b) New items, definitions and sources when needed; old ones dropped when no longer needed.

   c) Forms, items, processing steps, timing, all rationally justified in goals or purposes.

   d) All elements of network cognizant of relationship to end product and its importance.

2. Mechanics. Production of information, responding and processing.

   a) Items restricted to respondents objective and available data.

   b) Definitions and coding fit records of respondents.

c) Reporting media (e.g. forms) meet standards of convenience and utility and adapted to responding and processing.

d) Interlocking segments dovetail in format and get together at right time and place.

e) Work burden and cost not out of line for use value.

f) Statistical estimation, employed where consistent with degree of precision required by use.

g) End products available on time in right place for intended uses.

h) Processing equipment and methods appropriate.

In short, the problem of computer use is to get the machines to do what one wants done. In a system which is a network of partially voluntary components, there is the additional factor of uncontrolled information flow which can be overcome only by building, not at the center, but at the source, the school systems and institutions.

II

REPORTING FALL ENROLLMENT IN HIGHER EDUCATIONAL INSTITUTIONS

Planning analyses using projections of enrollments depend heavily upon fall enrollments of students in higher educational institutions. The fall enrollment statistic is particularly important as a measure of analyzing enrollment trends since it is a figure presumably showing an unduplicated number of students as of a given time. By being available as early as possible at the beginning of an academic year, it permits the use of information during the course of that year in studies which depend on such data.

Particularly since World War II, when the outlook for demands upon higher educational institutions was known to expand rapidly, it has been important to many engaged in planning and managing higher educational systems to have as rapidly as possible a picture of what is happening in the registration of students in higher educational institutions. The U.S. Office of Education among other agencies initiated a program of reporting fall enrollments at the conclusion of World War II and has developed a simplified short report of a more extensive form intended to supply expeditiously at the beginning of the year useful information on trends in higher educational enrollment statistics.

The State Education Department in New York as part of its reporting system assembles as of the fall of each year information on enrollment of students from all higher educational institutions in the State. The usefulness to the State Education Department or to others of these data depends in great part upon the rapidity with

which the information can be supplied by institutions, transmitted to the State Education Department and processed by the State Education Department for the use of those who require it. As a sample of the reporting network of the State Education Department with its higher educational institution respondents, this enrollment information area was selected as one information communication system to examine.

Nature of the Report

In essence, the existing substance reported by institutions to the State Education Department on fall enrollments is registrations as of the middle of October, of enrollments classified by major field of study by type of degree, by sex, and by year in school and by full-time or part-time enrollment. The classification of major field of study is adapted from the code system used by the U.S. Office of Education in its report of degrees conferred. The degrees conferred report is assembled from all institutions in the United States at the end of an academic year as of June 30.

For fall enrollment purposes it is condensed to major categories; for example, liberal arts and sciences are considered all one category even though this includes the biological sciences, english and journalism, fine and applied arts, foreign language and literature, mathematical subjects, physical sciences, etc. For fall enrollment purposes distinction in type of degree is made on these categories: associate degree programs, undergraduate bachelors' degrees, four years or more in duration, first professional degrees, graduate and higher level professional degrees, those taking college courses for credit who are not candidates for degrees. The total of these constitutes the figure on number of all of the degree credit students enrolled

in an institution.

For each major field of study this fall, a green sheet will be prepared by each institution, Form ST (C)-1a. This form calls for each field of study, enrollment by year in each degree program by full-time or part-time student and by sex. A full-time student is defined as one taking 12 or more semester hours of academic work or the equivalent in one semester. Each institution further reports on a form of identical format, Form ST (C)-1, the summary of the respective green sheets which represent each individual major field of study; except that the summary does not show the breakdown by year in program. In addition, the summary form calls for day and evening session, nondegree-credit students on campus, enrollment in extension courses, enrollment in summer session, undergraduate freshmen admissions, transfers in the junior class from other institutions by several fields and number of additional qualified juniors who could have been accepted with existing facilities in such specified fields.

The reporting forms thus make it possible to have a summary tabulation of enrollments in "engineering", for example, in the entire State in a table as shown in the diagram attached containing 63 cells, permitting the determination for each year through the course of an engineering program, the numbers of full-time men and women and total full-time students, the numbers of part-time men and women and total part-time students, and the grand total men and women and total of both men and women students.

The State Education Department Requirements

The question can be raised as to just why, for just what purpose, does

CANDIDATES FOR UNDERGRADUATE BACHELOR'S DEGREES
4 YEARS OR MORE IN DURATION

DEGREE(S) CONFERRED	FULL-TIME			PART-TIME			GRAND TOTAL		
	MEN	WOMEN	TOTAL FULL-TIME	MEN	WOMEN	TOTAL PART-TIME	MEN	WOMEN	MEN AND WOMEN
FIRST YEAR									
SECOND YEAR									
THIRD YEAR									
FOURTH YEAR									
FIFTH YEAR									
UNDISTRIBUTED BY YEAR									
TOTAL 2 — TOTAL ENROLLMENT OF CANDIDATES FOR UNDERGRADUATE BACHELOR'S DEGREES									

ONE PART OF FORM ST(C) - 1a

the State Education Department engage in collecting information on fall enrollments as previously described. There may be a number of ways of classifying possible functions to be served by a State statistical information system, but in the present instance it appears that the State's interest in fall enrollments falls into two major categories; one, the informative function and, two, the directive function. The nature of the State Education Department's role in the field of higher education, as the official State agency responsible for collecting and disseminating information, is first, to produce information not only useful in its own immediate operations but also as a means of communicating to all concerned what the general state of education is. The informative function includes regular published reporting of statistics and supplying unpublished information as may be required from time to time. The major published report coming under this informative function is a report on college and university enrollments such as "College and University Enrollment, New York State, Fall 1961 and 1962". This report lists individual institutions, publishes summary statistics for all institutions in the State on a full-time, part-time, by men and women breakdown in each of the degree categories.

One difficulty from the standpoint of utility, is the date it is possible for this to be communicated. The 1961-1962 materials were published as of the middle of the 1963-64 school year. Not all of the detail appearing in the data transmitted to the State Education Department appears in the published report. For instance, information on enrollment by year of student in course does not appear. Also, there is not a breakdown by major field, the basic unit of statistical reporting used in the system. The material in the published report is derived from the enrollment summary,

Form ST (C)-1.

What then is to be said concerning the necessity of individual institutions submitting the green sheets, Form ST (C)-1a, which are enrollment sheets by major field when these data are not reported? The answer would have to be in the possible requirement of information in such detail by individuals elsewhere in the State Education Department or outside of the State Department for detailed information regarding enrollments in particular areas. This appears to be another type of requirement of the informative function variety.

There is also the directive function. The State Education Department is the only education agency in the State which can assume responsibility for guiding by whatever means it can guide the futures and the fortunes of all educational operations. In other words, it has a responsibility in the areas of planning and research which are very similar to information of a statistical nature assembled by private enterprise for purposes of management in evaluating results and in planning for future programs. It is therefore assumed, for example, that enrollment by class level of student, by sex, and by full-time - part-time in various degrees by major fields is a type of information which, even if not published as a report, should be stored and available in a basic recordkeeping system of the State Education Department. This assumption is made simply because it is unclear at this point during the course of this study just what the purposes are for the information. This is a crucial decision since complex data collection mechanisms should be established with a hard look at end products. There is the danger of concentrating on the "means" rather than the "ends" when processing equipment of greater capacity becomes available. Establishing

"data banks" by storing information which some day, somebody might use can be a misapplication of electronic data processing equipment. For such reasons further examination of purposes and uses of the fall enrollment information is recommended.

Requirements of Individual Institutions

To a great extent the kind of information sought in the fall enrollment reports is from sources which are required for good management in institutions themselves at an early date. There are some exceptions to this. For instance, because of differences in the way colleges and universities are organized, their classification of students by major field or by type of degree might not fit the definitions used. Also, the major concern of an institution regarding its enrollment at the beginning of the year might not include breakdowns indentical to those required in the State report. In the tables shown in the accompanying diagram, one from Rensselaer Polytechnic Institute and one from Cornell University, are examples of summaries made by the individual institutions for their own use. It is of interest that in one instance tabulation is made showing the year of student and classification by day and evening, whereas in the other, the institution is concerned more with the breakdown as to men and women enrollment.

Not only because of the interest in having such information is the reporting of fall enrollment no great burden on the colleges, but also because the source documents are universally essential. These source documents are the admissions and registration documents.

Reporting Patterns of Institutions

With minor exceptions, as noted in the appendix of this report, the

Cornell University — Office of the Registrar

REGISTRATION - FALL TERM 1963
(as of Oct. 11, 1963-15 days after registration)

Colleges in Ithaca	Total Enrollment Men	Women	Total	Oct. 5, 1962	Matriculants Men	Women	Total	** Freshmen Men	Women	Total
Architecture: B. Arch	195	15	210	227	47	7	54	43	7	50
Fine Arts	14	54	68	59	6	16	22	4	14	18
Arts & Sciences	1938	1090	3028	2902	529	308	837	522	295	817
Engineering*(over)	1939	13	1952	1961	552	7	559	537	7	544
Hotel Administration	384	41	425	404	109	19	128	79	15	94
Unclassified	47	2	49	37	-	-	-	-	-	-
Bus. & Pub. Admin.	192	6	198	199	65	2	67			
Graduate	2055	539	2594	2343	616	222	838			
Law	339	7	346	313	117	5	122			
Agriculture	1611	288	1899	1919	524	85	609	469	78	547
Home Economics	--	732	732	705	-	223	223	-	204	204
Ind. & Lab. Rel.	348	59	407	397	79	16	95	73	15	88
Veterinary Medicine	222	8	230	231	23	1	24			
Totals:	9284	2854	12,138	11,707	2667	911	3578	1727	635	2362
In New York City										
Medical	313	24	337	341	62	2	64			
Grad. Sch. of Med. Sci.	23	14	37	35	22	13	35	Double Registrants		
Nursing	-	237	237	256	-	84	84	(over)		
Grand Totals	9620	3129	12,749	12,339	2751	1010	3761			

* Includes 17 men in Graduate School of Aeronautical Engineering.

**New students entering from secondary schools.

RENSSELAER POLYTECHNIC INSTITUTE
OFFICE OF THE REGISTRAR
ENROLLMENT FOR FALL 1963

	1st Yr.	2nd Yr.	3rd Yr.	4th Yr.	5th Yr.	Spec.	Total U.G. Day	Day Grad.	Eve. U.G.	Eve. Grad.	Eve. Spec. U.G.	Eve. Spec. Grad.	Hartford	Kapl	Grand Total
A.E.		55	52	32				24							
Ch.E.		53	39	47				50	4	13				1	
C.E.		30	33	50				34		15					
Env. Engrg.			1	1				13		4					
E.E.		181	167	151				77	7	26					
Engrg. Sc.		9	10	13				1							
Mgt.E.		15	47	75				64	2	68					
M.E.		64	61	63				51	30	6				8	
Met.E.		12	6	22				66	1	11					
Nuclear								42						1	
Biol.		13	14	11				10							
Chem.		39	28	22				72	1	17					
Geol.		6	5	9				13	1						
Math.		59	42	31				48		1					
Mech.		1	2					38		3				1	
Phys.		94	64	75				105	1	1				1	
Hum. & S.S.		5	24	39				13	1	14					
Not Cand. for Degree						8		28			39	89		8	
Total Engrgs.	611	419	416	454			1900	422	44	143				10	
Total Science	273	212	155	148			788	286	3	22				2	
Total Humanities		5	24	39			68	13	1	14					
Total Architecture	43	44	40	39	29		195	3	1						
Total Mgt.	1	16	17	8			42								
Unclassified						8	8	28	1		39	89	591	8	
Grand Total	928	696	652	688	29	8	3001	752	50	179	39	89	591	20	4721

institutions are now producing their fall enrollment reports more or less as a by-product of what appears to be an appropriate information system required for good management of the school admissions and registration functions. The accompanying flow diagram roughly indicates what the procedures are. The steps are as follows.

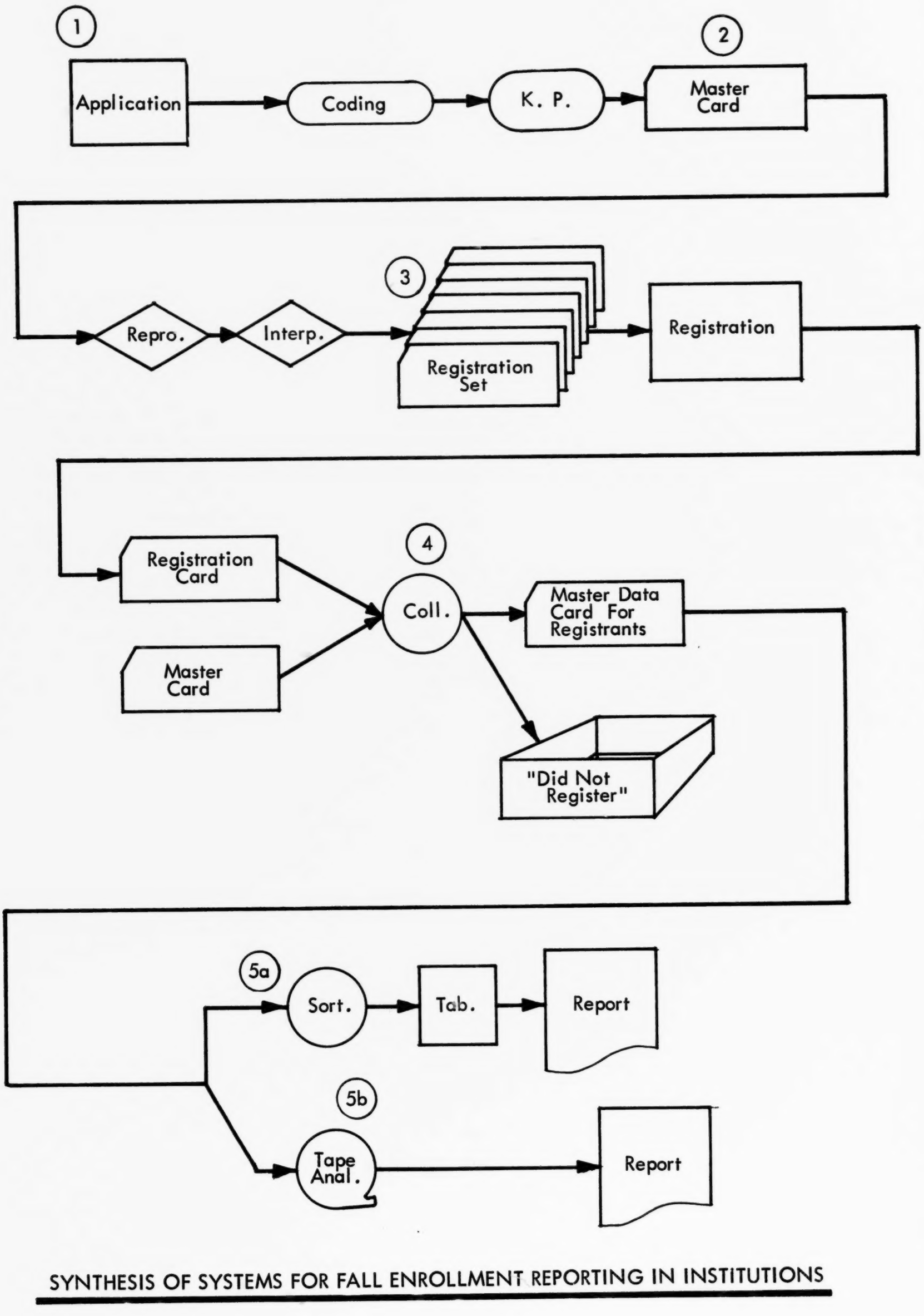
1. The Application for Admission. Generally, although various means are used by institutions for this, the application for admission contains the name of the student, sex, intended major field, school or college in which to be enrolled, information on previous college attendance, class or year in the program, the degree sought and whether attendance is to be full-time or part-time. The more advanced processing systems in institutions contacted in this study followed the dictum that "the earlier information can be obtained, in a form which can be utilized further, the greater is the potential benefit in fruitful use of the information and the elimination of repetitive steps."* A master card after coding is punched as a part of the student record system to be used in later stages of the operation of the institution and without reference particularly to the reporting of fall enrollments to the State Education Department.

2. The master card becomes the basic processing document for the enrollment system. This takes on various forms and in most of the institutions visited, results immediately from the application of a student showing such information as sex, school or college year in program, major degree intended, etc. Samples of such cards from a large and a small institution appear in the accompanying diagram.

3. Registration Cards. In most systems, the first function of the master card is the production of sets of registration cards on which is reproduced the basic identification of the student -- name, department, class, student number, etc. For example, in the case of Rensselaer, the stack of registration cards includes the student's card which after registration he carrys with him certifying his admission to classes, a card for the student's identification, the campus police registration card, the card for the Comptroller's Office, a card for the Office of the Chaplain, and a card for the Office of the Registrar. In most cases, the receipt of the registration card by the Registrar becomes a means by which he, if under his control, begins the task of supplying information on fall enrollments by whatever method. A collation with the master card file and some adjustments, as are always required, begins the processing of the enrollment report.

---

* Nelson Associates, Inc. A Registration Manual for Colleges. August, 1963 p. 1-11.



SYNTHESIS OF SYSTEMS FOR FALL ENROLLMENT REPORTING IN INSTITUTIONS

BROOME TECHNICAL COMMUNITY COLLEGE

CODE | NAME | CURR | YEAR | SEX | VET | COUNTY | BIRTH DATE | HIGH SCHOOL | SAT-V | SAT-M | APPLICATION DATE | SEMESTER | H.S. GRAD | AA

HIGH SCHOOL CODE 46-49 (5000)

APPLICATION FEE ☐ REC'D ☐ ACK

CEEB SCORES 50-55
V ---
M ---

H.S. TRANSCRIPT ☐ PRE REQ ☐ REC'D ☐ FIN REQ ☐ REC'D

CLASS RANK 56
1 2 3 4 0

ACCEPTED ☐ PEND GRAD ☐ UNCON

APPLICATION DATE 67-72

REJECT

SEX 73
X (11) FEMALE
0 MALE

VET 74
X (11) YES
0 NON VET

PHYSICAL ☐ SENT ☐ REC'D

MARITAL STATUS 75
S --- X (11)
M --- 0

H.S. GRAD. DATE 77-78

PERSONAL QUEST. ☐ SENT ☐ REC'D

HOUSING CARD ☐ SENT ☐ COMP ☐ REC'D

INTERVIEW 66 ☐ SENT

CODE 1-6

COURSE & YEAR 27-30

NAME 7-26

ADDRESS

BROOME TECHNICAL COMMUNITY COLLEGE

HIGH SCHOOL NAME

ADDRESS

SCHOLARSHIP 32 ☐ REQ'D ☐ GRANTED ☐ REC'D

COLLEGE ATTENDED 33 [1] BTCC [2] OTHER [3] BOTH

WITHDRAWN APPLICATION

TERMINATION

COUNTY CODE 37-39 (000)

PARENTS NAME

GRADUATED 79

BIRTH DATE 40-45

IBM U43600

UNIVERSITY OF ROCHESTER

1

MASTER CARD

2 | 3

STUDENT NUMBER	NAME – LAST NAME FIRST (LIMITED TO 20 SPACES)	SEX	CLASSIFICATION	SCHOOL

REGISTRAR: LINES 1, 2 AND 4 RESERVED FOR DATA PROCESSING. VERIFY EACH ITEM ON LINES 2 AND 4 AND CORRECT AS NECESSARY ON LINES 3 AND 5.

TOP HALF OF CARD FOR OFFICE USE ONLY

4 | 5

MAJOR	DEGREE	PRI. INSTN. (ESM ONLY)	2ND MAJOR (IF APPLICABLE)	TIME STATUS	MARITAL STATUS

STUDENTS: PRINT NAME AT RIGHT ONLY WHEN MISSING OR GIVEN INCORRECTLY ON LINE 2 ABOVE.

LAST | FIRST | MIDDLE

CHECK APPROPRIATE BOXES:

A. IS THIS YOUR FIRST TERM AT THE UNIVERSITY OF ROCHESTER? ☐ YES ☐ NO

B. IS THIS ALSO YOUR FIRST TERM AT ANY COLLEGE? ☐ YES ☐ NO

667664 RSC

RIVER CAMPUS EVENING SESSION STUDENTS ONLY:

EMPLOYER _____

ADDRESS _____

_____

EXAMPLES OF MASTER CARDS

4. Collation of the registration card with the master card file produces the master data card for registrants.

5. Tabulation. The final step is a process of enumeration, either by means of sorting of cards and tabulating or by means of tape if that type of equipment is used. The result is a print-out which permits the preparation of the ST (C)-1 and 1-a reports.

In all cases there are problems of the organization of the institution such as the necessity of securing supplemental information from department heads on degree or classification of student as to major and the like.

In the main, even with the best equipment available in institutions visited, a hand task begins at this stage. This is the hand transcription of results printed out from laborsaving statistical processing equipment for transmittal on the Education Department forms. This raises the question of how otherwise this might be communicated to the State Education Department. In a small institution the reporting is relatively simple and there is perhaps no alternative. In larger ones, with suitable equipment, some thought might be given to eliminating this remaining hand operation by the development of a standardized summary card which could easily be prepared by the equipment available and which could be transmitted for each major field in lieu of the ST (C)-1a forms.

One area of improvement in the flow of data is quite evident. There are considerable variations in the requirements of individual institutions due to their size, their organization and the like. However, the differences in the nature of forms of card design and processing methods are not all attributable to the unique requirements of each institution. In some respects systems are less efficient than they could be, had they been in all cases designed initially for data processing. Many of

them are an accumulation of improvements over what was initially a hand processing system and are in a sense improvisations for a record system which was conceptually not mechanized. A concerted effort on developing model procedures to be adapted as required in institutions certainly would help not only in expediting the transmission of information to the State Education Department, but also in providing more expeditiously required information needed internally.

The Communication Link Between Institution and State

There are a number of ways in which information of various steps in the data flow within institutions can be tapped for use in the State Education Department. The major considerations which would determine this are logically time and cost. An additional consideration, of course, would be accuracy. This element is presumably dependent upon the accuracy of the individual institutions' local processing systems and would be the same for any properly conceived transmission system to the State Education Department. The method of transmission would also depend upon the form of information most suited to uses and processing methods in the State Education Department. For example, if information at the Albany level was needed on an individual student basis, more information would have to be transmitted than if only totals were required of categories of student.

If processing was complex, requiring all the capabilities of the GE 225 computer, and if its capability in speed and processing was sufficiently superior and, at the same time, not excessively costly, there would be justification in the transmission of source data (decks of student master cards, tapes, etc.) to the State Educa-

tion Department from institutions. Even though unit data would not be desired, the State Education Department could, in effect sort, count, tabulate, or the equivalent, and thus produce an institution's report. It would be necessary, of course, to balance the cost against efficiency, measured by the time saved in accomplishing the end result at the State Education Department level.

For purposes of this report, none of the conditions appear to exist which would call for the transmission of source data to Albany. In the first place, it is assumed in this analysis that the information requirement at the State Education Department level is only the enumeration appearing in the individual cells of the reports, Form ST (C)-1a.

Wire transmission of a suitable input of unit data (student cards) to appropriate equipment at the State Education Department level would be cumbersome, costly and unnecessary. Mailing or shipping a tape or tapes with the necessary information on a unit basis would be just as feasible (in view of the timing required for producing these reports), but equally unnecessary. The results of this analysis show a basically common pattern of recordkeeping and processing in institutions, but by no means standardization of card design, programs, etc., that would permit such communication between institution and Albany except on the basis of unique programs for each individual institution. Since only information concerning totals of students enrolled by categories is the greatest detail, the only apparent alternative is transmission only of this information to the State Education Department.

There remains, of course, the question of the best method of transmitting just that information appearing on Forms ST (C)-1 and ST (C)-1a. To be sure, the

form is designed for uniform use by all types of higher educational institutions and is thus conceived as a hand-entered document. This is as it must be for small institutions which do not have electronic data processing equipment or for accommodating differences in the kind of reporting systems and forms of output of such systems in institutions which do have modern facilities for data processing.

It seems hardly appropriate that institutions with advanced processing equipment and systems must take on the hand-posting on these relatively complicated forms. The posting on the reports themselves is a matter of a few hours of time for a typist or statistical clerk, yet the entries within this document constitute the substance to be transmitted. Some attention might be given to the possibility of preparing these forms in a format adaptable to the more common types of data processing equipment. This would have value at such time as large numbers of institutions have equipment of a more or less standardized type. Short of this consideration, the possibility has been suggested of the State receiving print-outs, in lieu of the form itself, or possibly summary cards, which could be prepared on the institution level on a design usable by the State Education Department.

None of the types of adaptation of means of transmission of information to the State Education Department seem to justify modification at this time; unless there are to be modifications of the information requested on the form itself. For instance, some delays result from some breakdowns of enrollment required that are not easily determined, data processing or no, in institutions. Some of this information is of a type which has considerable statistical error at best. For instance, information on a student's class or year is in part arbitrary statistics by nominal defini-

tion as is the distinction of full-time or part-time enrollment based on number of semester hours taken. Short of asking a student to indicate his year or when he intends to graduate (an inaccurate measure), sources such as a college or department office or a Registrar's Office outside the basic records must usually be consulted student-by-student for this classification. In some institutions, difficulty is experienced in determining and/or updating this information in time for submission of Form ST (C)-1a by the deadline. Occasionally an institution itself is not interested and thus does not require this item or it will ascertain it after the pressures of registration at the opening of the academic year, or later during the semester. In all cases, however, the number of freshmen or first-year students is available even when a breakdown by other years is not.

This raises the question of whether or not it would not be worth a careful examination of this classification in the report in terms of the real value in its use. It is to be observed that marginal totals (that is, without the cross tabulation of major field, full-time vs. part-time, men and women and type of degree) is probably as useful as most statistical operations will justify in projecting enrollments or analyzing changes in patterns of offerings in higher educational institutions. This would mean for a major field of study such as "engineering", for instance, that there should be some thought as to why the following would not be sufficient:

A. Candidates for undergraduate bachelor degrees, four years or more in duration..... Total_____

1. Attendance
   Full-time.....____
   Part-time.....____
   Total_____

2. Sex
   Men....._____
   Women....._____
   Total_____

3. Class
   First year....._____
   Second year....._____
   Third year....._____
   Fourth year....._____
   Fifth year....._____
   Undistributed by year....._____
   Total_____

B. Candidates for graduate and higher level professional degrees..... Total_____

1. Attendance
   Full-time....._____
   Part-time....._____
   Total_____

2. Sex
   Men....._____
   Women....._____
   Total_____

3. Degree level
   Candidates for Master's Degree _____
   Candidates for Doctorate Degree..... _____
   Undistributed at graduate level _____
   Total_____

Some of the larger institutions also have difficulties in reporting graduate school students by major field. The classification system used for major field generally corresponds to the undergraduate divisions of the larger institutions but many students are registered in the graduate schools as a separate administrative division. For these institutions the reporting by major field means two separate and distinct surveys, one for the undergraduate by division and one for the graduate school

alone by college of major. Also the level of graduate degree is not always coded or dealt with at the registration stage, this suggests the possibility of pulling off essential information at one period and more detail at a later period for the type of results which are not easily obtained by institutions by the middle of October.

In the main much of the difficulties encountered by institutions in producing these reports promptly can be overcome internally without too much difficulty. Some of the systems of processing data appear to be partially compromises between the original hand-operated systems and adaptations to data processing equipment. There appear to be potential improvements in many of the institutions for this reporting which is basically a by-product of recognized best practices in management of the admissions and registration functions in an institution.

There are minor matters which can be worked out either as a part of the relationships between the colleges and the State Education Department or as a matter of internal organization within the institution. In cases where reports are delayed because the institution has a "cut-off" date for registration differing from the mid-October date, special arrangements can be made between staff of the State Education Department and the institution to facilitate a pretabulation or setting a compromise date. Particularly in the larger institutions, some help in designing a simple method of running and rerunning where there are two sets of definitions of time for running may call for some assistance and some compromising as to method of transmission of data by the institution. In one situation a school on a trimester system was completing one trimester as of the reporting date. This can be solved by definition.

The organization and control over machine time has some bearing on

expediting the reporting. This is something which is purely an institutional matter. It should be observed that any institution which is so organized that the functions of admissions and registration cannot be effectively handled by processing certainly should be encouraged to find a method of providing the equipment or of scheduling its use to handle this work. Enrollment reporting is so much a by-product of the work of the Registrar's Office that when the latter is efficiently handled the other should follow easily.

Some institutions have been caused inconvenience by receiving reports late. This turns out to be sometimes the result of the transmission of the reports to the president of the institution rather than directly to the individual such as the registrar who is responsible for submitting the report. This system can be corrected easily by the State Education Department. There are evidently some institutions which report late simply because of lack of interest or of motivation in reporting. This is a problem of relationships of agencies.

The relationship of the ST (C)-1 and the ST (C)-1a forms presents some problem to reporting institutions. The form ST (C)-1 is the summary requested prior to the detailed report by field on the form ST (C)-1a which is submitted by field of study. Most institutions find it advisable to complete form ST (C)-1a, the field of study form, and summarize tallies on this on to form ST (C)-1 to assure that the summary equals the total of detailed forms. This procedure seems logical and yet it is inconsistent with the system which requires the total without breakdown on the form ST (C)-1 prior to the submission of the detail.

Reporting College Degrees Conferred

Most of the above discussion has little bearing upon reporting of degrees conferred. This is due to the fact that little data processing is involved by institutions in the preparation of this report. It is a hand count or simple card count task in institutions. In smaller institutions this is a minor matter since numbers of degrees conferred is small (i.e. 200 or fewer) and classification by different categories of degree is relatively simple and discrete.

This reporting system is a U.S. Office of Education program. The State Education Department uses an identical copy of the form used by the U.S. Office of Education. This raises the question (even more so than in fall enrollment reporting) of the degree to which the U.S. Office of Education should be viewed as part of a conceivable "network" of communication.

There are some obvious reasons for looking for duplication of effort in reporting of degrees conferred during the course of information flow after the institution supplies initial data. It should be possible to develop in cooperation with the U.S. Office of Education a plan of one shot reporting by institutions. Since the State form is a duplicate of the Federal one, there appears little reason for not using some direct copy scheme for this reporting. Also, progress is being made in the U.S. Office of Education in the capabilities of its data processing equipment. The time may soon be at hand when data flow could be unduplicated either as (a) institution to Albany to Washington or as (b) institution to Washington to Albany. Even though uses at the two levels may differ, there is no problem even today in producing duplicate cards or duplicate tapes.

There appears to be some need to study timing from point of institutional reporting to published result. There is approximately a year lag between end of academic year and first U.S. Office of Education published report on degrees. A June 1964 Summary Report on Bachelor's and Higher Degrees Conferred During the Year 1962-63 by the U.S. Office of Education was disseminated in the fall of 1964. This summary presents marginal totals only, (a) by state and (b) by area of study. The report of similar information by area of study for New York State and by institution was released by the State Education Department about the same time for the years 1960-61 and 1961-62 in College and University Degrees, New York State 1960-61 and 1961-62.

Institutions report only one problem of significance in reporting these data. This has to do with classification of degree by major field of study. Unlike the fall enrollment report for which students are classified only in broad areas of study such as "Agriculture" and "Business and Commerce", the degree report requires a finer breakdown. Departmental and curricular organization of larger and specialized institutions does not always show detail required in this report. The biological sciences is a case in point. One institution finds it difficult to determine, by conferring with school or college heads, numbers of graduate degree recipients in biochemistry and biophysics. There were only 23 master's and 17 doctorate degrees in the entire United States reported in biophysics for 1962-63 (cf. report cited above). The breakdown in this reporting taxonomy calls for some unusually specialized categories which might, or might not match an institution's scheme of labelling degrees. In biological sciences five or fewer doctorates or master's degrees were reported in the United States in 1962-63 for the three subclasses, Cytology, Ecology and Embryology. Assuming that it is

of importance for this detail to be reported for someone's use, there is reason to doubt its accuracy if there were others in these special areas tabulated in "Biology General" simply because there was not the checking through of all programs of all degree recipients in all institutions to accommodate the reporting classification.

On the other hand, in the published results of these forms only total Engineering is reported since a separate detailed engineering degree report is requested by the U.S. Office of Education. (See U.S. Office of Education. Advance Report on Engineering Degrees, 1962-63 and Enrollments, Fall 1963.) The detail in the engineering report also presents classification problems. Some degrees are granted simply as "Master of Engineering" of all types and some specifically as "Master of Chemical Engineering", for example.

The classification difficulty is worth pursuing largely from the standpoint of validity of resulting statistics. Also, since it is a nation-wide reporting program, it is in the State's interest to activate continuous and critical reevaluation of this program in cooperation with appropriate national organizations.

III

NEW YORK CITY AND PROFESSIONAL PERSONNEL

This phase of the study differs in several respects from the reporting of higher educational institutions. The motivation is the same in one respect, namely, the respondent (in this case the New York City system) has extensive data processing equipment and is taking steps to develop its applications fully to internal management requirements and reporting. There is thus considerable justification in looking for ways of linking information processing in New York City with the processing capabilities of the State Education Department in Albany.

The information selected for pilot investigation was data on professional personnel. In view of the obligation of the State in the area of establishing and maintaining standards for qualification of teachers, there is more to this subject than simple reporting. The State Education Department function in receiving and processing higher education enrollment and degree data, particularly in privately controlled institutions, is to find out what is going on, not to manage, direct or control what is going on. Certification and placement of teachers in the public school system, however, is a function for which the State Education Department has direct responsibility. This means that, unlike student information from colleges, unit data is essential in this case at the Albany level.

The Professional Personnel Information

The data required by the State Education Department by individual professional employees includes:

Date of birth (for determining age)
Sex
Professional field and field assigned
Percent of time employed in system
Degree status
Salary
Tenure status of employment
Certification status
Years of experience by type of experience
Kind and location of employment previous year

This information is assembled in a uniform manner from all school districts except New York City on Form ST (S)-6a. The New York City School System issues its own teaching certificates, has its own system of classification of professional personnel and a system of processing designed for its special situation.

The Unique Aspects of New York City

There is a personnel reporting requirement for New York City unlike that for any other school system in the State. One complication arises from the fact that about a third (15,000) of the professional personnel in New York City are "substitute" teachers, though employed regularly and on a full-time basis. As substitutes, their records are not the same as those for permanent teachers. The present record system in the City does not provide required information on sex, marital status, age (date of birth), certification status, and years of educational experience for these teachers.

THE UNIVERSITY OF THE STATE OF NEW YORK
The State Education Department
Bureau of Statistical Services
Albany, New York 12224

PROFESSIONAL PERSONNEL REPORT FORM ST(S)-6a

School District Code

Check one
☐ New employee
☐ Continuing employee

School District _____ County _____

Name 1 ☐ Mr. 2 ☐ Miss 3 ☐ Mrs. _____ (Last) (First) (Initial) (Maiden)

Current Professional Field _____ (code)

Percent of time Employed in this District _____

Social Security Number ☐☐☐ - ☐☐ - ☐☐☐☐

Date of Birth ☐☐ (month) ☐☐ (day) ☐☐ (year)

Title of current position _____

Degree Status (Check one)

1 ☐ No Degree
2 ☐ Bachelors
3 ☐ Bachelors + 30 or more hours
4 ☐ Masters
5 ☐ Masters + 30 or more hours
6 ☐ Doctorate

Total Gross Salary _____
Number of months employed _____
Percent of time employed in this professional field _____

Nature of Appointment

Tenure ..... 1 ☐
Probationary ..... 2 ☐
Contract ..... 3 ☐
Substitute ..... 4 ☐

Certificate Appropriate to this Field (Check one)

1 ☐ Not certified
2 ☐ 5-year Provisional
3 ☐ 10-year Provisional
4 ☐ Permanent or life
5 ☐ Other

Educational Experience

Kind of Experience	Number of years
Total paid education experience	
Total in this district	
Total in this Professional field	

Occupation Last Year

Occupation (Check one)
1 ☐ Student
2 ☐ Teaching
3 ☐ Homemaking
4 ☐ Industry
5 ☐ Other

Location
Within N.Y.S. 1 ☐
Outside N.Y.S. 2 ☐
In this Dist. 3 ☐

Coding for Professional Fields

Code	Duty Assignment	Code	Duty Assignment
0100	Superintendent	5400	Health Education
0150	Administrative Assistant	5500	Home Economics
0200	Principal	5600	Library
2100	Kindergarten	5700	Music
2200	Common Branch (grades 1-6)	5800	Physical Education and Hygiene
3000	Gifted	5850	Recreation
3100	Mentally Handicapped	5875	Driver Education
3200	Physically Handicapped	5900	Speech
3300	Speech Correction	6100	Industrial Arts
3400	Reading	6200	Industrial and Technical
4000	Core Teacher	7100	School Nurse
4100	English	7200	Dental Hygienist
4200	Social Studies	7500	Guidance Counselor
4300	Mathematics	7550	Social Worker
4400	Foreign Language	7600	Attendance Teacher
4500	Science	7700	Physician
5100	Agriculture	7800	Psychology
5200	Fine Arts	8000	Adult Education
5300	Business and Distributive Education	8100	Audio Visual
		9999	Other*

* Includes:

Research Assistant
Philosophy
Homebound — if not elementary
Helping
Substitute
Study Hall
Dentist

For both permanent and substitute personnel in New York City information is not now available on years of experience in the district, years of experience in the professional field, percent of time employed and, for new teachers, kind and location of employment previous year. Also, degree status is recorded in the City in slightly different form. For instance, there is no distinction in the City between teachers with the Bachelor's plus 30 or more hours and those with the Master's Degree. Classification of professional field in the City permits some calculation of teachers by field, though not completely fitting the system used for the rest of the State.

Possible Steps to Take

The points of focus on this problem are:

1) Definition and coding of information required
2) Processing in New York City
3) Transmission to Albany

The solution as to what information can be reported depends in large part upon how much the New York City system can do, and should do, in revising its basic record system so as to provide missing information for both permanent and substitute teachers. The anomalous nature of the New York City system must be recognized. How far New York City can, within the framework of its operation, supply new information for substitute teachers depends in part upon how important it is to fit New York City into the rest of the State with respect to supplying such information as years of experience. Some of the missing information, however, appears to be of a type which would be important for the City system itself.

It appears that further work on this and other statistical reporting

problems concerning New York City should begin with assistance from the State, in its own interest, on the highly unique and complex situation in the City. The New York City Board of Education offices get information on pupils and personnel from over 800 schools. This is almost the same number of "respondents" as the school districts the State depends upon for its public school statistics. With nearly a third of the State's total volume of information in New York City, the State should undoubtedly look to the time when it would have some of its own equipment and personnel in the City itself for purposes of facilitating data flow and providing the desired "information network".

The time for studying the subject of computers in the communication system is not remote. The Board of Education in New York City has been reorganizing its entire statistical operation and adding new equipment. It is planned, further, to consolidate data processing formerly distributed in various components of the City organization. Presently the City system is using two IBM 1401 computers. A 7010 is on order. Information on teachers now comes from two sources, one the payroll. A tape file is planned for all personnel. The teacher records file is now limited to permanent teachers only. Data for substitute teachers comes from payroll records.

Arrangements have been made to send to the State Education Department available data on substitute teachers on tape which is compatible with equipment in Albany. This type of adaptation of transmission of information to Albany from the City should be expected to be practised more and more as cooperative planning of statistical reporting continues.

IV

IMPLICATIONS FOR BUILDING A STATE EDUCATION INFORMATION NETWORK

The results of this pilot study do not point immediately to revolutionary developments in "computers talking to computers". Nevertheless, with the more sophisticated planning and designing of reporting and record systems, and advances in processing equipment on both the State and local or institutional levels, the time is at hand for tooling up for what should exist in efficient reporting within the next five or ten years. The ultimate goal is the time when most, if not all, statistical information will come to Albany in a form designed for modern data processing equipment. This calls for different kinds of thinking -- designing and planning -- than how to adapt hand-entered reporting systems so that computers can use them.

The major ideas in this connection which have come out in this study follow.

- In order to expedite the flow of information to the State Education Department, the State agency should build around operating systems of reporting institutions and local school systems.

- The concept of "information network" by its very nature implies decentralization. The State can develop such a network partly by cooperative planning with larger institutions and school systems now using modern data processing equipment, but it may have to supply some of the elements in some communication channels at points outside the Albany center. A State Education Department communication outpost is needed in New York City. Data processing outposts are springing up in some of the BOCES centers partly to facilitate statistical reporting. This development could well be speeded up from the standpoint of a system -- an information network.

- Only as such a network is in the making can the linking of computers

have much meaning. The New York City reporting of professional personnel is a case in point. Information sent to Albany on a tape is just as satisfactory as this information on thousands of report forms and is a more efficient way of doing things. In working toward the future, thought should be given to fewer unit records coming to Albany. This will work if data exist in a form which is easily tapped in institutions and local school systems. In a genuine and fully developed information network, detail to be stored in Albany could be held to a minimum. Data of importance of the type which is from time to time required could be tapped if and when needed. This, in principle, is saying that the network concept should contemplate different communicating substance, not just different ways of transmitting the same information.

- The matter of compatibility of equipment is no real problem in statistical reporting from reporting units with adequate equipment. Special arrangements to expedite reporting or ease the burden of reporting at some point are hardly worth the cost because of the current lack of uniformity in processing systems within reporting units. In other words, special programs and coding systems would have to be worked out, for example, for some universities for reporting student statistics. The New York City problem is an exception because of its size. It would pay to develop a special system from ground up to handle New York City statistics.

- The nature of reports covered in this report are such as not to require full advantages of computer processing. These reports all deal with simple enumeration. To be sure, data processing equipment under consideration can count and add rapidly and is therefore useful. However, the chief value of a computer is in computing. This points to the desirability of lifting the level of sights for end products of such statistics. A computer can be programmed, for example, to project trends, to produce factor analytic information relating to variations in college attendance, retention in college, accession rates, major fields, etc. Similarly, the real value of the computer in the professional personnel field is not just in getting the totals on time, but to extract more information from the data which will help to understand what goes to make up the teaching profession in New York State, how it got that way and how it is changing.

- Aside from the processing aspect of reporting, there were other areas touched in the course of this study which bear on the State reporting system. The importance of the coordinating function at the State level came up frequently in work with higher educational institutions. The enrollment and degree reporting is part of the Federal system. Coordination with the U.S. Office of Education data flow requirements is therefore part of the State reporting picture. The State can lead as well as follow in planning the future of such reporting. A coordination

on the State level is also indicated for the State institutions which report through the State University of New York. There is some evidence of the need for a State information clearing house. One university reported over 100 requests for enrollment information duplicating what it had sent to the State Education Department.

APPENDIX -- DIGEST OF SAMPLE OF RELATED HIGHER EDUCATIONAL INSTITUTION DATA PROCESSING PROGRAMS

The following text and diagrams resulted from correspondence with and visits to campuses of six higher educational institutions in regard to fall enrollment and degrees conferred reporting.

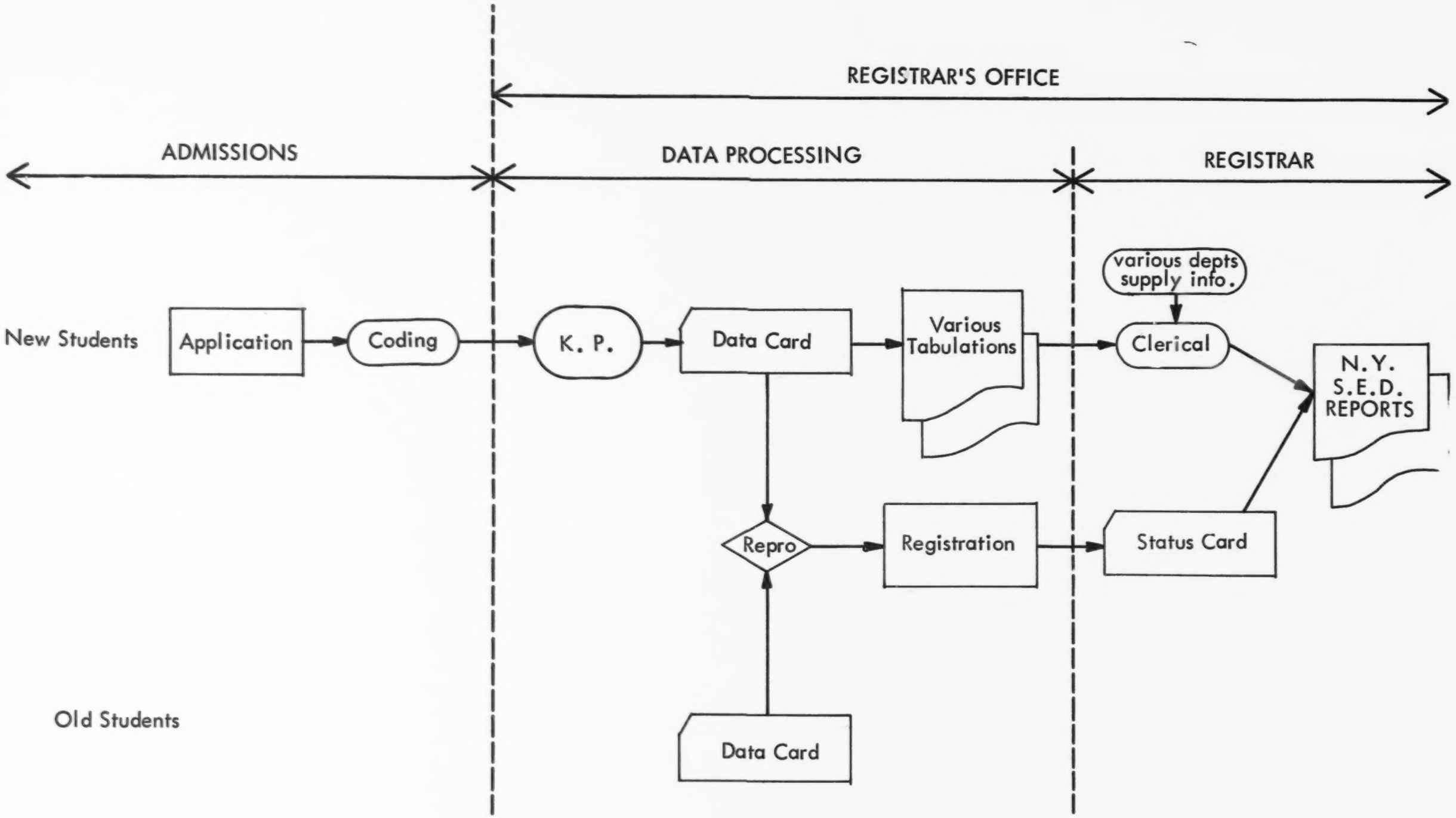
Broome Technical Community College

Equipment. Uses IBM full capacity 403 with bill feed, reproducing summary punch, a sorter, two key punches, 077 collator and a verifier in process of being added. This equipment is deemed adequate to handle needs for foreseeable future. An IBM 1620 computer is on campus primarily for educational purposes.

Source Documents. Most source documents exist prior to the time of registration. An Admissions Card is punched from information found in the students' application. This card is duplicated onto a "status card" which is interpreted and given to the Registrar's Office for its use as a reference and for compiling reports.

Coding. Coding is of small significance. Those used are simple and unique to Broome Tech.

Processing. By means of data processing equipment, several types of lists of students by name are prepared from the Admissions Card with summary totals as follows:



FALL ENROLLMENT FLOW CHART - BROOME TECHNICAL COMMUNITY COLLEGE

by name, alphabetic
by curriculum
by count
by class
by high school
by marital status
by veteran status
by date of birth

These lists would be complied whether required or not by outside agencies but serve as a basis for compiling entries on State and Federal forms. The processing for fall enrollment reports for the State Education Department and the U.S. Office of Education is straightforward. However, as part of the State University of New York, this institution supplies considerably more information to the State University system which, for example, shows residence of students by county. In order to supply data required by the State University, it is necessary to supplement the source documents noted above with lists and unpunched cards supplied by various departments. For example, identification of students in liberal arts areas requires special information from department chairmen to determine number of students in each field.

The reporting functions of the Registrar's Office are not considered to be burdensome even though hand tallying from machine lists and data is necessary. As a part of the State University of New York, this College fills out the SUNY forms rather than Federal ones. The degrees conferred report to the State Education Department is compiled by hand count.

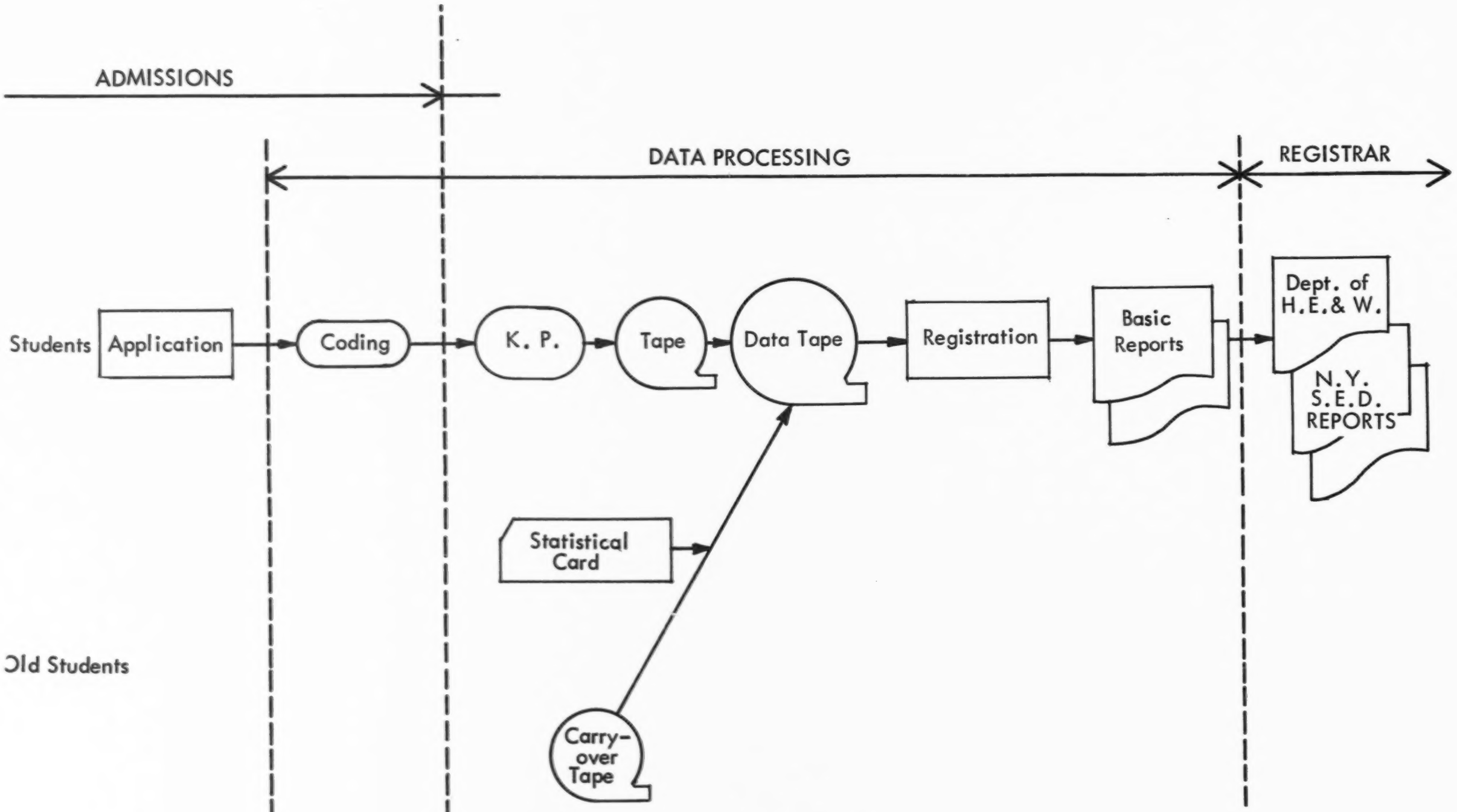
Reporting Problems. It is reported that the system of definition, classification and coding as required by the State Education Department practically in no

way agrees with the system developed for the College for its own use. The same problems of definition exist. For instance, an evening student enrolled in a program not leading to a degree could, nevertheless, be taking courses which would be quite acceptable as credit toward a degree. Since the data processing used by the Office of the Associate Dean and Registrar which prepares statistical reports is under the control of that office, there are no organizational problems in this College as to scheduling of processing involved in the reporting operation.

Cornell University

Equipment. Uses IBM 1401 computer (8K storage capacity) with four tape drive units, and 1403 printer unit. IBM auxiliary machines such as sorters, collators, reproducers, several key punches and verifiers, and a 407 electric accounting machine (tabulator).

Source Documents. Most source documents exist prior to the time of registration. For undergraduates, an Admissions Card is sent to applicants which, when returned, is coded and punched. For graduates, first data come from a form sent to the Registrar's Office by individual schools from which information is coded and punched. For old students, the information required for reporting fall enrollment exists in the record system. Upon acceptance of a student, punching of data is entered into the tape system from a more comprehensive data form, sent to the prospective student and returned. Prior to, or at the time of registration, data from such sources is printed out on a form for correction by the student and corrections or changes are made in the data processing system.



FALL ENROLLMENT FLOW CHART - CORNELL UNIVERSITY

Coding. Cornell has its own codes for almost every item where coding is of value. Most of these codes were developed before codes were adopted by the U.S. Office of Education. There are some, though small, variations between breakdowns in fields of study between the State and Federal system of classification and practices at Cornell.

Processing. Information for the fall enrollment reports is produced by the Machine Records Division of the University from stored information as described above. The situation is different, however, for reporting degrees conferred. In general, undergraduate divisions do not require the selection of a major until the junior year whereas graduate schools start out (usually) in a particular major. No record of undergraduate majors is kept in the tape system or in the Registrar's Office. In order to fill out forms calling for undergraduate majors this information must be solicited from the schools concerned. Major field tabulations for the degrees conferred reports are done by hand for graduate students and most undergraduate divisions using the commencement announcement and other lists as the sources.

Reporting Problem. Difficulties observed at Cornell in the production of reports include:

a) The number of sources of data (schools) and competition which the Registrar's Office has with other divisions of the University for use of the data processing facilities.

b) The Graduate School at times has not completed coding of new students as to field of study at the time of survey of enrollment for advanced degrees is due the U.S. Office of Education.

c) Cornell has some special problems because four units of the University are state divisions under contract for which there

is a special reporting which does not, in all cases, synchronize with the reporting of the State Education Department and U.S. Office of Education.

d) Some data required by the State would not normally be used internally by Cornell University, i.e., geographic distribution below the state level.

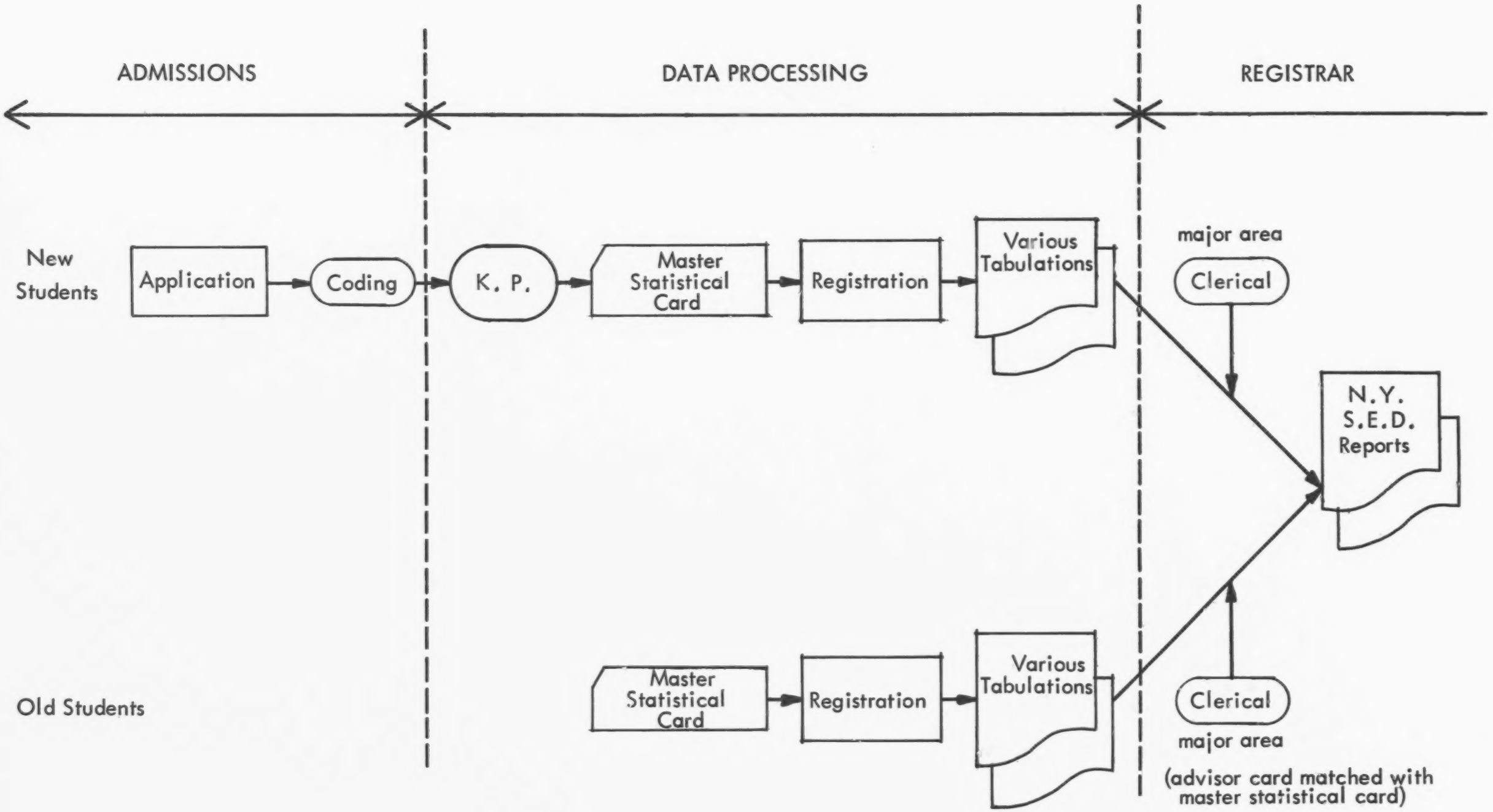
Harpur College

Equipment. Equipment is presently non-computer type consisting of a IBM 402 accounting machine, 082 sorter, 085 calculator, 514 reproducer and 548 interpreter.

Source Documents. The initial source of information is admission data which is punched into a student's Master Statistical Card. An additional source card is the "Advisor Card" which is matched with the Master Statistical Card to produce the field of specification. The degrees conferred report is made by hand count in the Registrar's Office. This is no problem since there are only about 200 graduate students involved.

Coding. There are some slight differences between the State and Federal report forms and the College's breakdowns of major fields of study. As part of the State University of New York, Harpur supplies information directly to the State University on information required for Federal reports. As a growing institution it apparently uses almost all of the information required on all of the reports internally.

Processing. The machine section requires forms containing data to the Registrar who draws desired information from same for entry onto the State University of New York fall enrollment forms. Several tabulator runs



FALL ENROLLMENT FLOW CHART - HARPUR COLLEGE

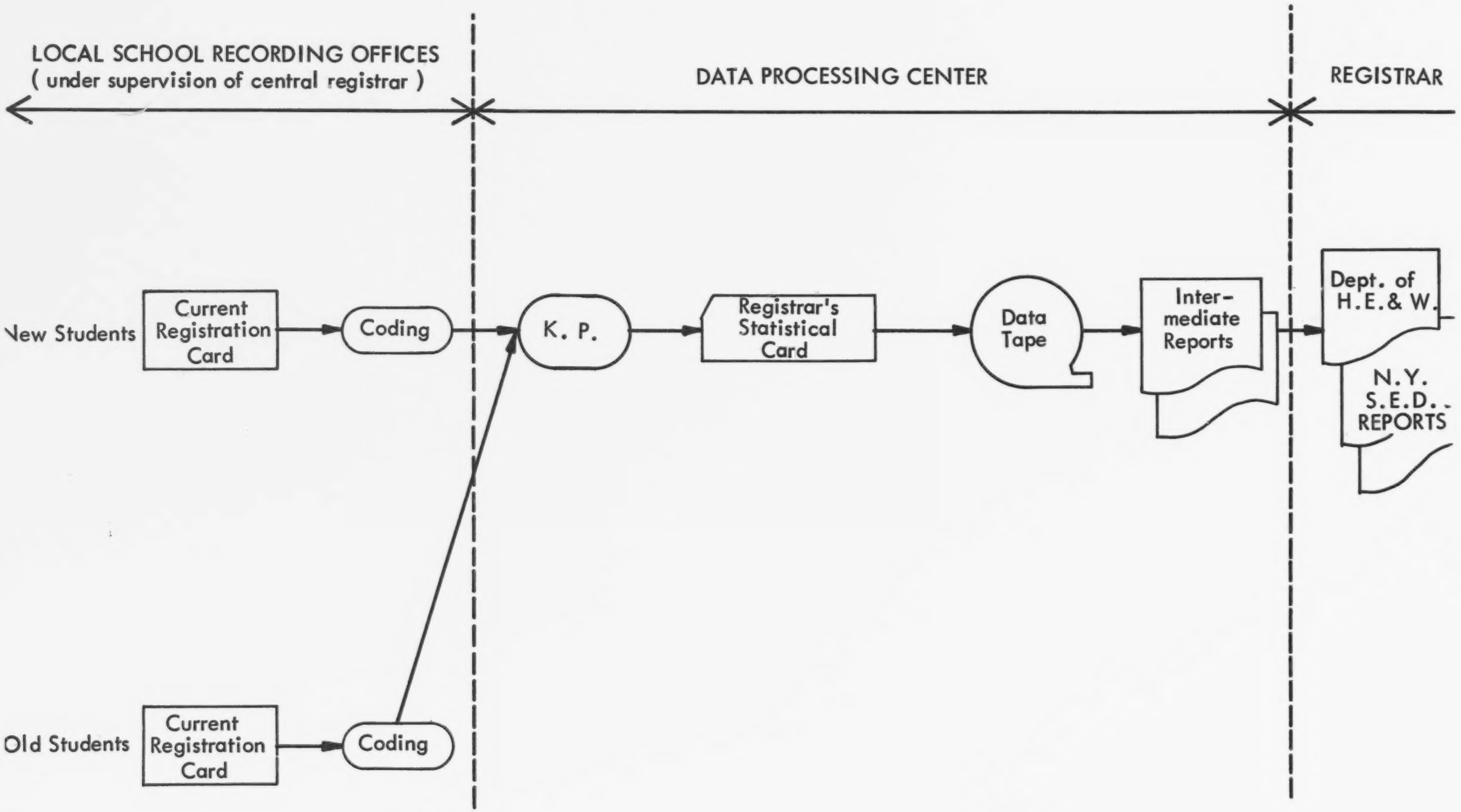
are required with punched cards arranged differently for various tabulations in preparation of the fall enrollment reports. For all students the Master Statistical Card is a basic source card. For new students the application form supplies information for a statistical card. All the statistical cards are then processed with the information at registration and the remaining after. This screening begins the card source for internal tabulations which contribute to the statistical fall reports.

Reporting Problems. The trimester system used in Harpur created a different problem for people of fall enrollment as of the October 15 date since this occurs as one trimester is terminated and another is about to begin. No particular trouble is noted in filling out the required report forms. There is some reason to believe that slightly more advanced data processing equipment would be helpful in expediting the processing of the reports.

New York University

Equipment. The basic equipment used in reporting fall enrollment and degrees conferred at New York University is an IBM 1401 computer with a 12K capacity with auxiliary equipment.

Source Documents. Basic source documents for enrollment data are the student current Registration Cards. These Registration Cards are maintained in the several divisions of the University and vary slightly. The commencement lists prepared by each local school recording office constitute the source documents for the report of degrees conferred.



FALL ENROLLMENT FLOW CHART - NEW YORK UNIVERSITY

4FALL 63 | 12 DEPT. | BILLING CODE | 65 CLASS | ARBOR ALAN M STUDENT NAME | 02667 STUDENT NUMBER

RENSSELAER POLYTECHNIC INSTITUTE

DEGREE DEPARTMENT _____ OPTION _____ CLASS _____

COURSE NUMBER	COURSE TITLE	CREDIT HRS.	SECTION	APPROVED

STUDENT'S CARD

5020164 | 12 | 65 | ARBOR ALAN M NAME OF STUDENT | 02667 STUDENT NUMBER

0210164 EXPIRATION DATE | CODE

STUDENT IDENTIFICATION CARD

IDENTIFICATION CARD.

4FALL 63 | 12 DEPT. | BILLING CODE | 65 CLASS | ARBOR ALAN M STUDENT NAME | 02667 STUDENT NUMBER

AMPED

URER

JOHN A. DUNLOP, REGISTRAR

1

RENSSELAER POLYTECHNIC INSTITUTE

FOR

OFFICE OF THE CHAPLAIN

1 2 3 4 5 6 7 8 9 10

2FALL 63

RENSSELAER POLYTECHNIC INSTITUTE

FOR

OFFICE OF THE REGISTRAR

IBM 896502-0

IMPORTANT

FILL IN BOTH SIDES

1 2 3 4 5 6 7 8 9 10 11 12 13

12 DEPT. | BILLING CODE | 65 CLASS | ARBOR ALAN M STUDENT NAME | 02667 STUDENT NUMBER

COURSE NUMBER | CREDIT HRS. | SECTION

A. JONES, TREASURER

7FALL 63 TERM | DECAL | LICENSE NUMBER | 12 DEPT. | 65 CLASS | ARBOR ALAN M STUDENT NAME | 02667 STUDENT NUMBER

DO NOT WRITE ABOVE THIS LINE

PLEASE PRINT

DECAL NO.

RENSSELAER POLYTECHNIC INSTITUTE

LAST NAME | FIRST NAME | MIDDLE NAME

CAMPUS POLICE REGISTRATION

TERM 1 2 3 4 5 6 7 8 9

3FALL 63

RENSSELAER POLYTECHNIC INSTITUTE

FOR

OFFICE OF THE COMPTROLLER

IBM 180859-0

IMPORTANT

FILL IN BOTH SIDES

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 STUDENT NAME | 33 34 35 36 37 STUDENT NUMBER | 38 39 DEPT. | 40 41 42 CLASS | 43 44

12 DEPT. | BILLING CODE | 65 CLASS | ARBOR ALAN M STUDENT NAME | 02667 STUDENT NUMBER

DEPARTMENT _____ CLASS _____

LOCAL ADDRESS _____

NAME OF PARENT OR GUARDIAN _____

ADDRESS _____

REGISTRAR'S OFFICE	TREASURER'S OFFICE

METHOD OF PAYMENT

A. BY SELF OR GUARDIAN

B. BY FEDERAL GOVERNMENT

1-NROTC - HOLLOWAY PLAN

2-C.E.C.

3-ASSIGNED OFFICER :

AIR FORCE ☐ ARMY ☐

NAVY ☐

C. SPECIFY ANY DEFINITE BILLING INSTRUCTIONS

REGISTRAR'S CARD

AN EXAMPLE OF A SET OF REGISTRATION CARDS

Coding. The systems of definitions, classifications and coding at NYU parallel that of the New York State Education Department and, with respect to earned degrees, the coding of the U.S. Office of Education, with slight modifications.

Processing. For the fall enrollment reports each recording office of the University codes a statistical card for each student registered. These cards are then processed by the Data Processing Center and reports are available usually at the beginning of the sixth week of classes. For the report of the degrees conferred, punch cards are prepared in the Registrar's Central Office using the final commencement list. As a part of the management function in the Office of the Registrar a fairly elaborate system of enrollment reports distributed in various ways for internal use is prepared regularly. For this reason the State and Federal reporting is, in great part, a by-product of the internal reporting system.

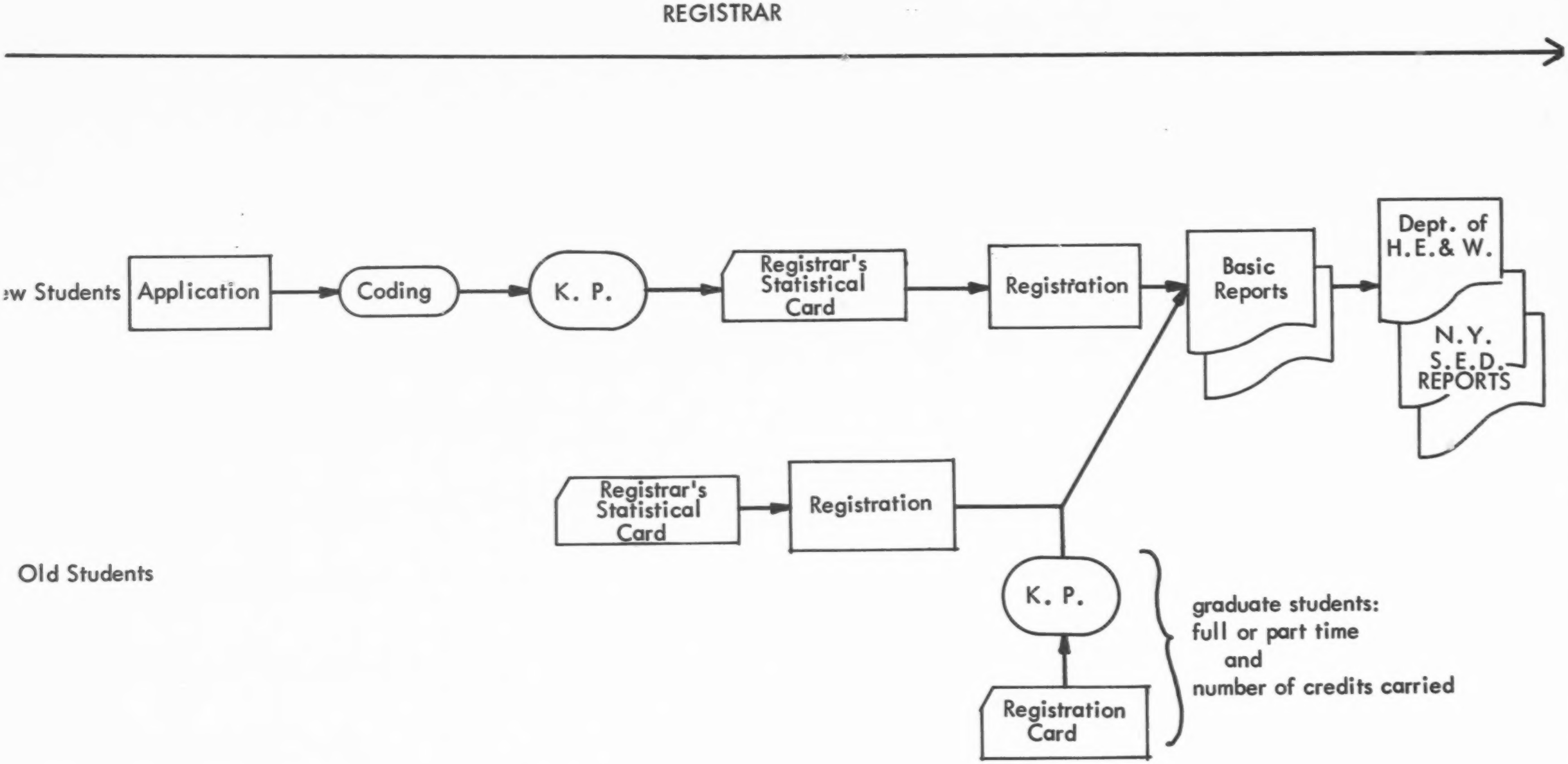
Reporting Problems. One difficulty mentioned in expediting the fall enrollment reporting is the fact that there are large numbers of late registrations which delay the reporting. This material must be held because of the nature of the system in individual recording offices until what is considered a suitable time to get a complete picture of registrations for internal use. This delays completion of the fall enrollment report for transmission to State and Federal agencies. The late registration component is small in percentage but large in numbers for an institution of this size. Something in the neighborhood of 2,000 late registrants were involved in the fall of 1964.

Rensselaer Polytechnic Institute

Equipment. The Registrar's Office uses an IBM 1410 system with card input and output located in the Mathematics Department of the Institution. The work for the Registrar's Office relating to reporting of enrollments is performed by the staff in the Registrar's Office, both programming and processing, with technical assistance supplied by machine personnel.

Source Documents. The basic source document for continuing students is a "Registrar's Statistical Card" prepared by machine from previous years' students statistical information stored on cards. Information concerning geography, sex, date of matriculation, date expecting degree, degree being pursued, marital status and school origin, is graded on this card by hand in code form. For new students, the desired information is obtained from the application form and hand coded. There is thus preliminary documentation of information ahead of the time of registration as in most other systems covered. For graduate students, classification of full-time or part-time and number of credits carried is obtained from Registration Cards after registration and is punched into the system.

Coding. No specific observations noted on the coding problem. The Institution uses its own codes. Some standardized codes such as geographic source of student are used, as in other cases the codification of field of study for reporting purposes is not entirely suited to the Institution's curricular organization and system of classification of students. Year in degree program is based upon word of students as to year expected to graduate. This differs from other



FALL ENROLLMENT FLOW CHART - RENSSELAER POLYTECHNIC INSTITUTE

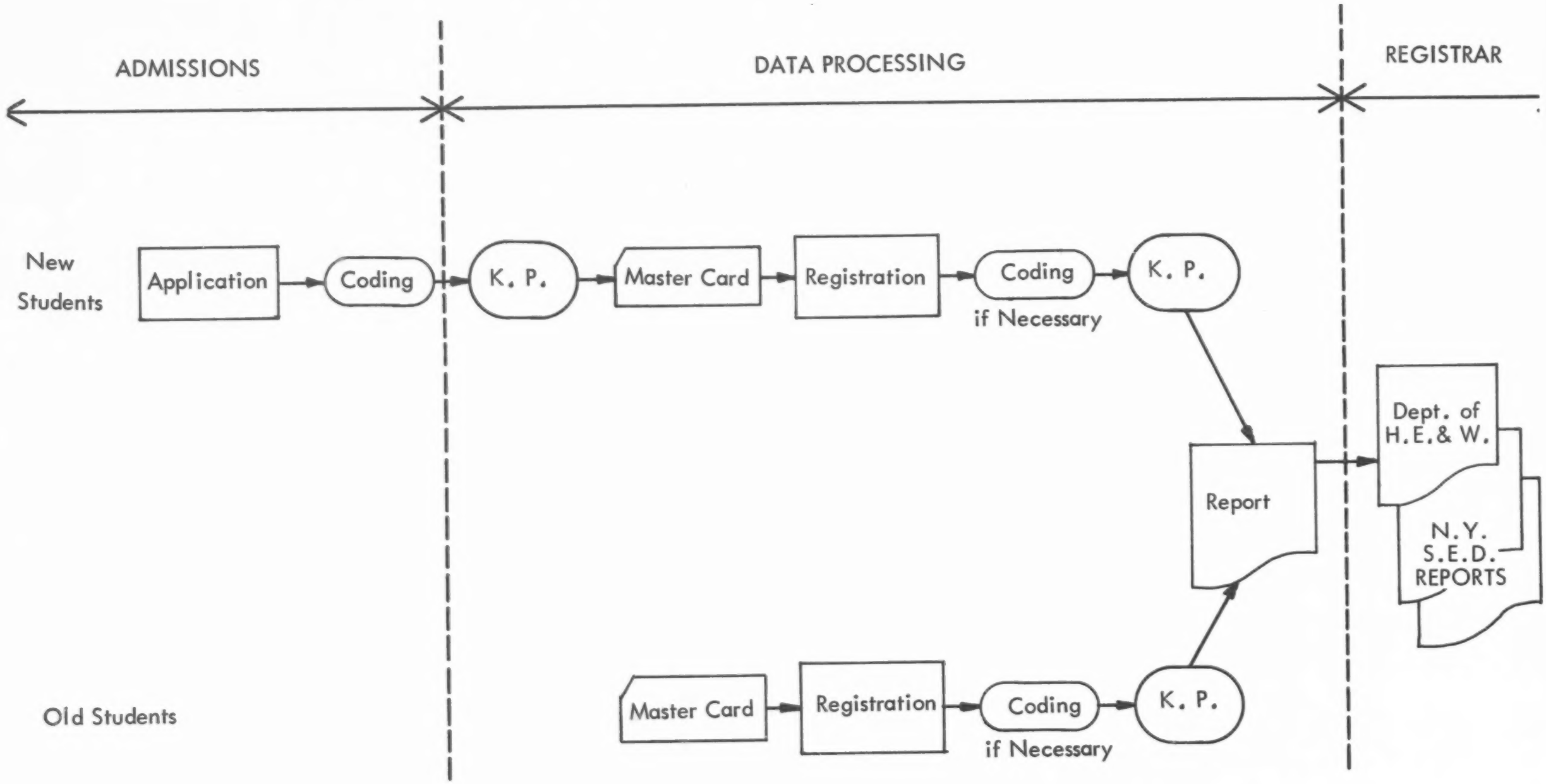
institutions which classify students as to year in program by credit hours accumulated.

Processing. Registrar's Statistical Cards prepared from application forms for new students and from existing records for old students is cleared through registration, and with minor supplementation, becomes the source for tabulating reports of enrollment. The reports on degrees conferred is prepared by hand. Since the report is prepared in the Registrar's Office and the Registrar is responsible for final clearance of degrees to be conferred, the information is available in the office preparing that report.

Reporting Problems. The system depends heavily upon punching. One complication in reporting arises from the fact that RPI has a branch in Connecticut, the enrollment of which is reported to the U.S. Office of Education, but not to the State Education Department. A source of delays in reporting has been noted at this institution, such as receiving State Education Department forms for degrees conferred after the close of the academic year. Preferably, forms should be in the hands of respondents well in advance of due dates. Delays in receiving forms apparently sometimes occurs as a result of their transmittal to the President of the Institution rather than the Registrar who is responsible for their preparation. In this respect, there is a difference between the transmittal system of the State Education Department and the U.S. Office of Education. The latter addresses its forms requesting enrollment information to the Registrar.

University of Rochester

Equipment. The facilities at Rochester consist of a IBM 1401 computer presently with 8K storage capacity in the process of being increased to 12K



FALL ENROLLMENT FLOW CHART - UNIVERSITY OF ROCHESTER

plus usual auxiliary machines.

Source Documents. As is common practice, the Master Card is prepared from data originating from Admissions information for new students and from existing records for the old students. This card contains information on the students' sex, class, school or college, the major field, degree sought, full or part-time status and marital status. This is the basic card used by the Registrar's Office for the preparation of enrollment reports for both the State and Federal agencies. The degrees conferred report is prepared by hand from the commencement announcement and contains the names of the recipients and the degrees they are to receive.

Coding. A student's major is designated by a letter coding system; for example, English is ENG. As in the case of other institutions, the system of classification of students relative to degrees conferred is, in many respects, unique. For example, the State and Federal forms combine Language and Literature whereas Rochester, for its own purposes, is interested in separating Literature.

Processing. Enrollment reports are produced by machine tabulation from the Master Cards. The report on degrees conferred is hand tabulated.

Reporting Problems. Evidently data collected and internal reports dovetail quite well with the requirements of State and Federal reporting. Degrees conferred information as required by the Office of Education is not of much use internally. As in the case of many institutions the classification of both first- and second-year undergraduate students by department or college is in some cases difficult and arbitrary.